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TAGS: EPET ENRG EINV EIND ETRD ECON SF
SUBJECT: RESTRUCTURING OF THE SOUTH AFRICAN ELECTRICITY INDUSTRY -- THE SUPPLY SECTOR

REF: PRETORIA 00094

THIS CABLE IS A CORRECTED COPY OF REF A: FORMATTING PURPOSES

¶1. (U) Introduction: In light of recent government initiatives to restructure the South African energy industry, post will submit separate reports on the supply, distribution and transmission sectors. Each cable will serve as a general review of that sector, and be the launch-pad from which subsequent cables on specific topics are prepared, as developments take place in each sector. The first, dealing with the supply sector, follows. The purpose of these cables is to indicate the potential opportunities for investment, technology and service providers created by the energy-restructuring program. End introduction.

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Electricity Supply Industry (ESI)
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¶2. (U) Summary: At the beginning of this decade, in the absence of new supply, the South African Government concluded that demand for electricity would soon overtake existing generation capacity. Government tasked the National Energy Regulator (NER) to develop a National Integrated Resource Plan (NIRP) for insuring security of future supply. The first NIRP was completed and published in March 2002. At the beginning of 2003, the NER established an Advisory and Review Committee (ARC) to solicit stakeholder contributions to the NIRP process. The updated study (October 2003), generated under the guidance and approval of the NER, was carried out by a NIRP team comprising the Eskom Resources and Strategy Group (headed by their Managing Director, Dr Steve Lennon), the Energy Research Institute (ERI) of the University of Cape Town, and the NER.

¶3. (U) In the early seventies Eskom forecast an electricity growth rate of 8%, and consequently built and commissioned a number of six-pack (six generation units per station) coal-fired stations. In the middle of the construction program, the demand growth rate dropped as low as minus 0.4%, causing a serious over capacity, and three of the stations - Camden, Komati and Grootvlei - were "mothballed". Decommissioning ended in about 1990. The excess capacity allowed Eskom to become the lowest cost producer of electricity in the world. Eskom's tracking of electricity consumption identified a significant increase in demand (from about 2000), and they forecast that new peaking capacity would be required by 2007, and new base load capacity by 2011. In October 2003, the NIRP-team updated the 20-year energy supply plan based on the new demand projections, and estimated capital expenditure of some $17 billion to 2010. The main purpose of the plan was to identify the most cost-effective and environmentally friendly combination of options and technologies available to ensure South Africa of a timely, reliable and quality supply of electricity in the future. Schedules and technologies will inevitably change over time as new developments occur. End summary.

Current Capacity and Technology Mix
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¶4. (U) South Africa's total licensed generation capacity is about 44,000 MW of which Eskom (state-owned electricity utility) owns 42,000 MW. Eskom mothballed 3,600 MW of capacity in 1990 and their total net operating capacity (NOC) at December 31, 2003 was 36,200 MW. Coal-fired stations generate 86% of the electricity, nuclear 5%, pumped-storage 4%, hydro 2%, emergency gas turbines 1%, and 2% is imported from the Cahora Bassa hydro station in Mozambique.

¶5. (U) Eskom currently operates 10 large coal-fired power stations, a two-reactor 1,800 MW nuclear station (Koeberg located 30 kilometers north of Cape Town), six small hydro stations, and two pumped-storage schemes that play a critical role in meeting peak demand. Municipalities own 22 small power stations and back-up gas turbines, but

these total only 5% of national generation capacity and generally run at low load factors. Municipalities also own the transmission lines and the transformers located within their boundaries. Private generators comprise the remaining 2% of capacity. In 2003, the peak demand was 32,000 MW, equal to 89% of NOC. Estimated demand growth is at least 1,000 MW per annum, and the current growth rate stands at around 4.6%.

¶6. (U) According to Mike Cary, Managing Director of Rotek Engineering an Eskom group engineering company, a complicating factor to the capacity problem is that the power stations are ageing. The ages of the newest stations vary between 10 and 24 years, and the equipment on these stations can be as old as 30 years. Although Eskom has a comprehensive maintenance program, the old equipment is more prone to failure. Part of the risk-management strategy is to carry spares, but financial constraints limit this option. Over the past 12 months, Eskom has experienced an abnormally high failure rate (14 major supply disruptions in the Johannesburg area alone) and some of the plant transformers have failed to such an extent that some critical spares are no longer available.

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Eskom's Expansion Plans
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¶7. (U) Government decided in 1998 to restructure Eskom and to establish a multi-market model (MMM) for electricity trade in South Africa. During the four-year model planning process, Eskom submitted its investment program for new electricity capacity (as its contribution to the NIRP) on an annual basis. The estimated cost of the expansion program was about $32 billion (over 20 years), and aimed to ensure that South Africa had enough electricity to power its growing economy.

¶8. (U) However, during this time Eskom became a virtual "on-looker" as government decided that Eskom would not be allowed to build any new generation capacity as the government wanted to have the MMM in place before the excess capacity ran out. Eskom, however, remained the supplier of last resort and obligated to ensure sufficient supply to the country. Part of the plan to restructure Eskom was to sell 30% of their generation capacity, valued at more than $4 billion, to foreign power utilities. Due to a policy shift, this process remained in limbo. Eskom and Government now face crucial decisions about new power plants, and the balancing of financial, operational and environmental criteria in selecting the type and mix of energy projects it should develop.

¶9. (U) Following the April 2004 elections, new Public Enterprise Minister Alec Erwin (Eskom's shareholder department) rescinded the "restructuring" of Eskom. This was part of a general policy shift aimed at strengthening State Owned Enterprises to ensure that the social objectives of government would be met first. Erwin fast-tracked the go-ahead for new investment in electricity supply, as outlined in the NIRP. On October 20, the Cabinet approved $13.5 billion in capital expenditure for Eskom to return to service the mothballed stations, build 70% of new capacity, and upgrade existing stations, transmission lines, and distribution networks. Government expects Eskom to source much of this capital from the markets. Erwin also "offered" independent power producers (IPP's), particularly foreign utilities, a 30% slice of the proposed new generation capacity. In this way, he hopes to ensure healthy competition for Eskom and to attract foreign direct investment into the infrastructure sector of the country without damaging Eskom's ability to lead the expansion drive. Steve Lennon, Eskom's Managing Director for Resources and Strategy, has stated that the investment decision was in time to avoid early supply disruptions in 2006 and 2010.

Short-Term Expansions to 2010
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¶10. (U) The latest update of the NIRP's power expansion strategy (October 2003) deals with expansions envisaged up to 2022. The first phase deals with immediate electricity needs over the next five years. This requires Eskom and IPP's to add at least 1,000 MW of capacity every year, from 2005 to 2010, to avoid shortages during peak usage time. The investment package portions the $13.5 billion as $9.7 billion for generation, $2.2 billion for distribution, and $1.6 billion for transmission. The plan is for Eskom to return to service three coal-fired stations between 2005 and 2011 -- total base-load capacity of 3,600 MW. In addition, Eskom is to build a new 1,000 MW open cycle gas turbine (OCGT) plant by 2007 (location not specified), and by mid 2005 the DME plans to request the private sector to tender for a 1,000 MW OCGT plant (location not

specified), fueled by a light diesel distillate, to be operational by 2008.

Longer-Term Expansions - 2011-2022
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¶11. (U) By 2010 Eskom will have to start commissioning power plants that will add to the base load for which planning will start in 2005. According to Lennon, the program was based on the forecast of an increase in demand of 1.5%-4% per year over the next 20 years. However, there are contingency plans for an uptake of 5% should demand exceed estimates. The long-term base load capacity would include a combination of new power plants and imports of electricity from a number of African projects. Capacity increases include:
-- a $0.7 billion, 1,330 MW pumped-storage scheme at Braamhoek in KwaZulu/Natal Province, by 2013,
-- a $0.8 billion, 1,000 MW pumped-storage scheme at Steelpoort in Mpumalanga province, by 2014,
-- a third 1,000 MW pumped-storage facility at Monontsa in the Free State province, and planned for 2019,
-- a $1.4 billion, 1,500 MW combined cycle gas turbine (CCGT) facility, possibly located near Coega (new deep water port under construction) in the Eastern Cape Province, by 2013,
-- three generation units (total rated capacity of nearly 2,000 MW) added to the six already operating at the Mathimba power station in Limpopo Province, at a cost of $3.2 billion,
-- a 4,000 MW greenfields coal-fired power station, at an estimated cost of almost $6.4 billion, near coal reserves in either Limpopo or Mpumalanga provinces, or in neighboring Botswana or Mozambique.

Summary of Capacity Expansions to 2022
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¶12. (U) Some electricity expansion options considered by the NIRP team extend beyond the 2022 time-period, but are shown for information completeness. Obviously, these technologies and time schedules will change over time as energy demand, innovations and other developments occur.

| Generation Stations and Technologies | Implementation Schedule | New (MW) Capacity |
|---|---|---|
| 3 De-mothballed coal-fired (possibly fast-tracked to 2009) | 2005-2011 | 3,600 |
| 10 Single/Open Cycle Gas (SCGT) | 2006-2010 | 2,640 |
| 1 SCGT | 2022 | 240 |
| 3 Dry-cooled coal-fired | 2016-2022 | 9,630 |
| 2 Pumped-storage | 2012-2014 | 2,330 |
| 1 Pumped-storage | 2019 | 1,000 |
| 5 Fluid Bed Combustion | 2012-2014 | 2,330 |
| 1 IPP Open Cycle Gas (OCGT) | 2008 | 1,000 |
| Total new capacity | | 22,770 |

Other possible options for the future (probably beyond 2022) include:

| | |
|---|---|
| 3 Combined Cycle natural gas | 3,470 |
| 1 Nuclear Pebble Bed cluster of 8 reactor units | 1,320 |
| 1 Coal-fired | 3,780 |
| 1 Pumped-storage | 1,000 |
| Total possible new capacity | 9,570 |

PBMR
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¶13. (U) According to Lennon, environmental criteria are critically important in deciding the combination of new power plants to be developed. This could benefit non-coal projects, as Eskom's coal-fired plants are the chief emitters of carbon dioxide and other pollutants. Environmental considerations could also provide a boost to development of South Africa's fourth-generation nuclear-based pebble bed modular reactor (PBMR), which could be ready for commercial launch by 2013, and features in Eskom's long-term expansion plans, from about 2015 onwards. The capacity of a single PBMR reactor unit is 165 MW, and that of an 8-pack cluster, 1,320 MW. Johan Kriek, CEO of PBMR Ltd, plans to start construction of a PBMR demonstration unit in the second quarter of 2007, the first commercial unit by 2013, and to supply Eskom with 24 units (three clusters) between 2013 and ¶2023. Lennon said that negotiations have started in the process to develop a PBMR supply agreement between PBMR Ltd and Eskom.

Imports
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¶14. (U) The African electricity import projects on the Eskom drawing board include Cahora Bassa in Mozambique, the proposed Inga3 hydro-electric project in the DRC, and buying surplus power from the Southern African Power Pool, as available. Lennon said that part of Eskom's

strategy could be to put equity into Cahora Bassa, depending on the financial details of such a deal. In addition, in November 2004, the South African utility was one of five Southern African utilities that bought equal equity stakes in Westcor, the company earmarked to build the $5 billion power station at Inga3, and the associated transmission and interconnect supply lines. The project has the potential to supply 3,500 MW of electricity by 2011, but many experts believe this to be an unrealistic target, given the political (and investment) uncertainties in the DRC.

Status of the Expansion Plan
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¶15. (U) The first phase of the expansion, dealing with new capacity over the next five years, is well under way. Eskom has commissioned the return to service of three mothballed power stations at a total cost of $1.9 billion. These three facilities, when refurbished, should supply 3,600 MW to the grid. The largest of the three, Camden, is set to return to service in 2005. The DME has also authorized Eskom to build a new 1,000 MW open cycle gas turbine (OCGT) plant by 2007 (location not specified), and a 1330 MW pumped-storage station (Braamhoek) by 2013, as part of a $13.5 billion investment. In December, the DME issued an IPP "Expression of Interest" document for a 1,000 MW OCGT facility (location not specified), fueled by a light diesel distillate, to be operational by 2008. The tender document should be available by August 2005, and Eskom, as the purchaser of the electricity, cannot bid for the project. The final leg of Eskom's short-term revamp will be to upgrade a number of its older base-load stations, including a $160 million upgrade of the 2,100 MW Arnot station. Through demand and supply side efficiency-improvement strategies, Eskom management plans to take 4,000 MW out of the system by 2013.

Financing the Expansions
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¶16. (U) Eskom spokesman, Fani Zulu, has indicated that Eskom would finance the $13.5 billion expansion for the first three years through a combination of cash flows and loan financing. After that, Eskom is likely to revert to the local and offshore capital markets. Eskom, has a relatively low 30% gearing, and has some room on its balance sheet to raise its debt level. A crucial part of the financing would be the electricity price, which the NER determines. The regulator has recently granted Eskom below-inflation tariff increases, but Minister Erwin has backed Eskom's call for more realistic prices to enable the huge capital expenditure requirement.

¶17. (U) In summary, the main conclusions drawn from the latest NIRP study by energy experts, are that:
-- Options for diversifying away from coal-fired plants are insufficient to meet forecast electricity demand over the next 20-years,
-- Economic justification for diversification plants would prove difficult in the absence of persuasive measures such as penalties and subsidies for non-use or use,
-- Clean coal technologies and demand side efficiency strategies are required to meet environmental standards,
-- Base load plants would be required for commercial operation after 2010,
-- At assumed future costs, and after returning the Eskom mothballed plants to service, fluidized bed combustion (FBC) technology offers the most economical option, followed by coal-fired plants, and then CCGT plants (in the western Cape), using imported gas/LNG,
-- NIRP plans indicate that 920 MW OCGT peak load plants must begin commissioning from 2008,
-- NIRP plans assume the attainment and sustainability of demand side management targets, power plant availability, imports, and interruptible supply strategies,
-- short-term peak-load requirements can be facilitated using single cycle gas turbines fueled by locally-produced synthetic gas.

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Summary of South African Energy Statistics
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¶18. (U) Projected Electricity Supply/Demand (MW)

| | 2004 | 2008 | 2012 | 2016 | 2022 |
|---|---|---|---|---|---|
| Generating Capacity | 38,620 | 41,990 | 46,060 | 50,700 | 57,540 |
| Peak Demand | 34,620 | 38,530 | 42,020 | 45,660 | 51,890 |
| Reserve Margin (%) | 11.6 | 9.0 | 9.6 | 11.0 | 10.9 |
| New capacity | - | 3,390 | 8,460 | 13,140 | 19,990 |

Current Supply (MW)

Eskom:
Coal-fired 32,070

| | |
|---|---|
| Nuclear | 1,800 |
| Pump Storage | 1,400 |
| Hydro | 570 |
| Gas Turbines | 340 |
| Total | 36,180 |
| | |
| Non-Eskom: | |
| Coal-fired | 1,320 |
| Pump Storage | 180 |
| Hydro | 70 |
| Gas Turbines | 90 |
| Total | 1,660 |
| | |
| Imports: | |
| Cahora Bassa (hydro) | 780 |
| Total | 38,620 |

South Africa's Energy Mix

| Product | End Use % | Electricity Generation % | Energy Supply % |
|---|---|---|---|
| Coal | 86 | 69% | 30 |
| Crude | - | 18% | - |
| Biomas | - | 9 | 8 |
| Nat gas | 1 | 3% | - |
| Hydro | 2 | | |